REGENERATIVE BATTERY PACK TEST SYSTEM MODEL 17040

Chroma 17040 Regenerative Battery Pack Test System is a high-precision system specifically designed for secondary battery module and pack tests. The energy regenerative function greatly reduces power consumption during discharge, and ensures a stable power grid without generating harmonic pollution on other devices - even under dynamic charge and discharge conditions. Where traditional equipment discharges waste energy in the form of heat, Chroma 17040 can recycle the electric energy discharged by the battery module back to the grid, thus reducing waste energy and alleviating HVAC requirements.

Chroma 17040 has built-in parallel channels and dynamic profile simulation functions. The parallel capability maximizes the charge and discharge current and power, thus increasing the efficiency and flexibility of equipment utilization. The dynamic profile simulation allows users to load a battery waveform of a given drive profile in either current or power mode to meet the NEDC/FUDS requirements. Its bidirectional architecture assures uninterrupted current during the charge and discharge transient state so that the driving conditions can be accurately simulated in line with the ISO, IEC, UL, and GB/T international test standards.

Equipped with Chroma's powerful Battery Pro software, the test system offers flexible test editing functions to perform independent channel tests, and conforms to various requirements for testing secondary battery packs with high safety and stability.

Chroma 17040 ensures protected charge/discharge testing through multiple safety features including Over Voltage Protection, Over Current Protection, Over Temperature Protection, and external parameter detection. The recovery functions prevent that test data is interrupted or lost in the case of power failure.

Ethernet

CE

MODEL 17040

KEY FEATURES

- Meets international standards for battery testing: IEC, ISO, UL, and GB/T, etc.
- Regenerative battery energy discharge (Eff. >90%, PF >0.95, I_THD <5%)
- Auto-ranges with multiple voltage and current ranges for optimal resolution
- High accuracy current/voltage measurement
  ±(0.05% rdg + 0.05% F.S.)
  ±(0.02% rdg + 0.02% F.S.)
- Current slew rate (10%~90%)
  1ms (< 300kW)
  10ms (300~600kW)
- Dynamic (current/power) driving profile simulation tests for NEDC, FUDS, HPPC
- Test channel parallel function
- Test data analysis function
- Data recovery protection (after power failure)
- Automatic protection for abnormalities
- Battery simulator (option)
- High power test equipment
  Voltage range: 60~1000V
  Current range: 0~1500A
  Power range: 0~600kW
- Customized integration functions
  - Integrated temperature chamber
  - BMS data analysis
  - Multi-channel voltage/temp. recording

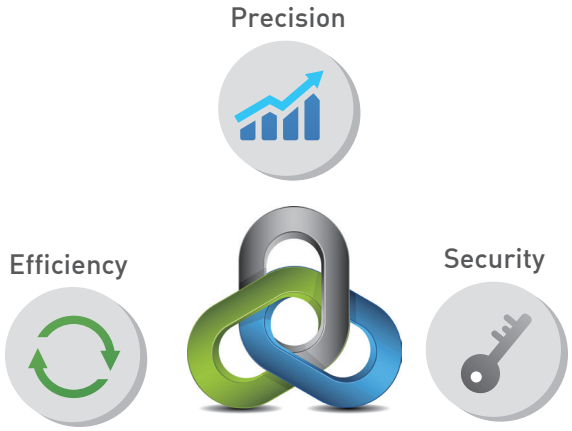
FIELDS OF APPLICATION

- Power battery module
- Energy storage system
- Motor driver
- Power control system

Chroma
Advancing Excellence

SYSTEM FEATURES

Specifically designed for secondary battery module and pack tests, Chroma 17040 Regenerative Battery Pack Test System offers ultimate precision, safety, and efficiency. The main features include recycled energy, parallel channels, high power for battery applications, and high accuracy in voltage and current measurement as well as drive cycle simulation.

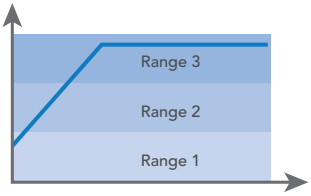


Precision

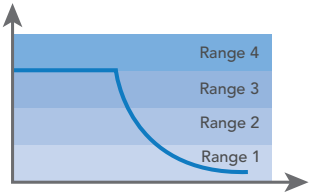
High-precision Measurements for Improved Product Quality

The auto voltage/current range function switches between multiple ranges. When there is a dynamic change between large or small currents, the test system automatically adjusts to the right range to optimize the measurement accuracy.

- Voltage accuracy: ±(0.02% of rdg. ±0.02% of F.S.)
- Current accuracy: ±(0.05% of rdg. ±0.05% of r.n.g.)



Auto voltage ranges

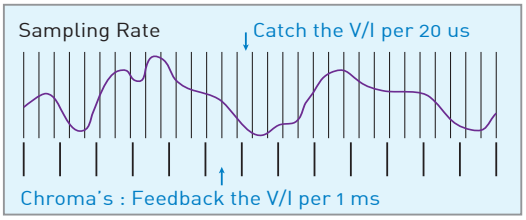


Auto current ranges

High-frequency Sampling for Battery Pack Capacity Capture

The high-frequency sampling measurement technology reaches a 50kHz sampling rate to ensure dynamic measurement accuracy. Other battery chargers and dischargers use software to read current values for power computing; however, limited data sampling speed could result in large errors when calculating the dynamic current capacity. Chroma increased the V/I sampling rate and added a double-sampling integrator, so the 17040 test system is able to provide capacity calculation with much higher accuracy. When the current changes, the data is not lost and the transmission speed is not affected.

- V/I sampling rate: 50KHz (per 20μs)

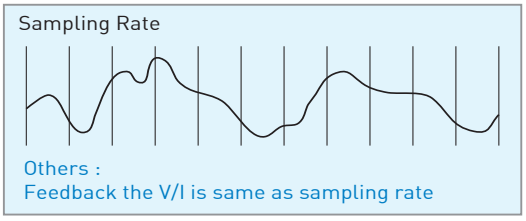


Chroma charging/discharging sampling speed

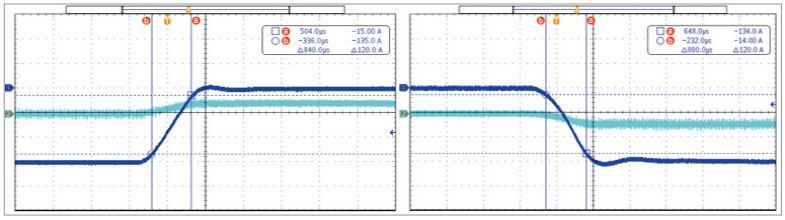
Quick Response Testing for Battery Pack Limit Verification

Chroma 17040 supports dynamic driving profile simulation (waveform), which simulates the current and power states of actual driving conditions to comply with NEDC, FUDS, and HPPC standards. The quick current response enables optimized charge/discharge switch control; the current is smooth without overshoot to avoid damage to the battery.

- Current slew rate: 2ms (-90% to 90%)

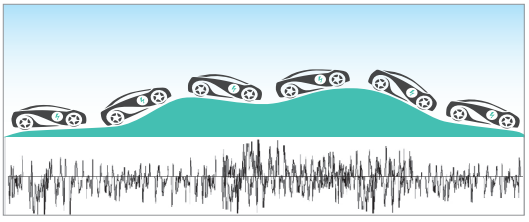


Others' charging/discharging sampling speed



Discharge to charge:
Current slew rate < 1ms (10% to 90%)

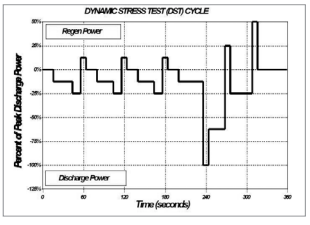
Charge to discharge:
Current slew rate < 1ms (-10% to -90%)



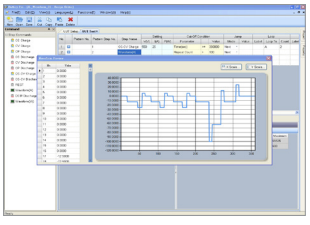
Actual driving profile simulation

Dynamic Driving Profiles for Actual Use Simulation

Battery packs are used under quick and irregular current conditions. Chroma 17040 performs actual dynamic charge/discharge waveforms to simulate working conditions and verify the response of the battery pack in real-life applications. Users can set the test steps to read a specific Excel file with stored current/power waveforms.



Compliant with test standards



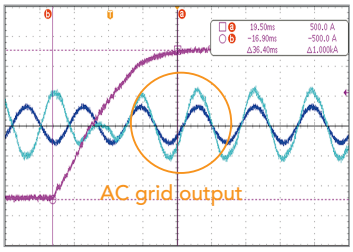
Profile simulation data loading

Safety

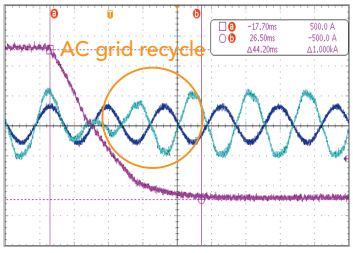
Bidirectional Circuit for Power Supply Protection

The bidirectional circuit architecture allows highly efficient recycling of the discharge energy. Chroma 17040 accurately controls reverse current changes, the AC current waveforms are smooth and show changes in real time, and the design meets the grid requirements without contaminating other equipment on the grid. When any abnormalities on the power grid are detected, the test system will swiftly cut off the main circuit power supply to protect its safety.

- Regenerative discharge efficiency > 90%
- Total Harmonic Distortion (THD) < 5%
- Power Factor (PF) > 0.95



Transition from discharging to charging



Transition from charging to discharging

Energy Recovery Design for Personnel Safety (Option)

VDE test requirements, in short, are the main items to consider when the generator is connected to a low-voltage distribution network on the grid. Even when using multiple devices, they can maintain the safe and reliable operation of the grid in accordance with the German Energy Industry Law and with the voltage limits in the DIN EN 50160 regulations. The optional equipment meets the VDE-4105-AE test requirements with the following protection functions:

- Voltage protection: V < 0.8Un, < 0.2s / V > 1.1Un, < 0.2 s / V > 1.15Un, < 0.2s
- Frequency protection: f < 47.5Hz, < 0.2s / f > 1.5Hz, <0.2s
- Islanding detection: < 5 sec

Multiple Output Protections for Battery Test Risk Control

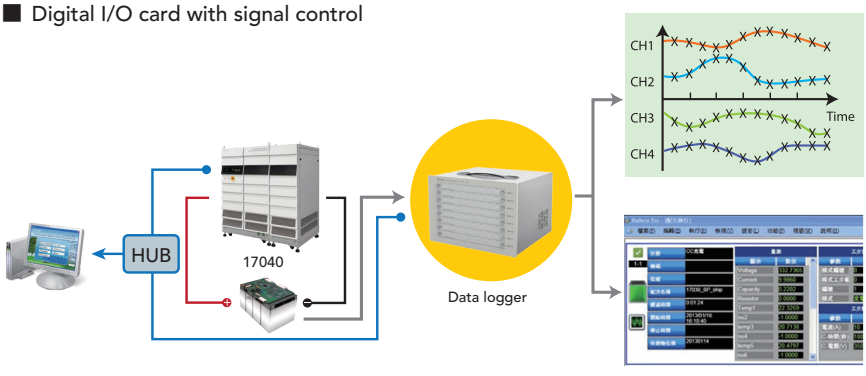
Chroma 17040 meets the test requirements for secondary battery packs and offers a high degree of stability and safety. The charge/discharge protection will stop the test when it detects any abnormal test status. The internal firmware and hardware provide multi-layered protection. And the protection parameter of test procedure is loaded into them directly to provide a variety of alarm and protection modes.

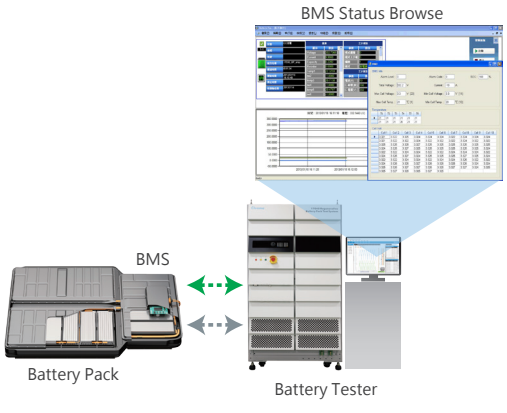
- Voltage protection: over charge / over discharge / delta voltage change
- Current protection: over current / over capacity / delta current change
- Other protections: over temperature / wire loss / over power / CC-CV transition time

Software and Hardware Protections for Battery Cells (Option)

The Chroma BatteryPro software can integrate third-party hardware with charge/discharge protections that will stop the test when detecting any abnormal conditions. A designated datalogger can read the charge/discharge voltage and temperature of multiple cells and use the measured data to set the protection conditions. Similarly, a designated battery management system (BMS) data acquisition system can read multiple sets of BMS data through CAN bus and RS-485 interfaces, and then convert the data for protection conditions. An additional Isolated DIO Card can be integrated in Chroma test system for controlling the high-side/low-side driver signals of device, the function support digital output, digital input, safety channel output, safety input from external devices, and digital input and output for alarms, cut-off, and power off.

- Data logger with test data protection
- BMS data acquisition system with test data protection
- Digital I/O card with signal control



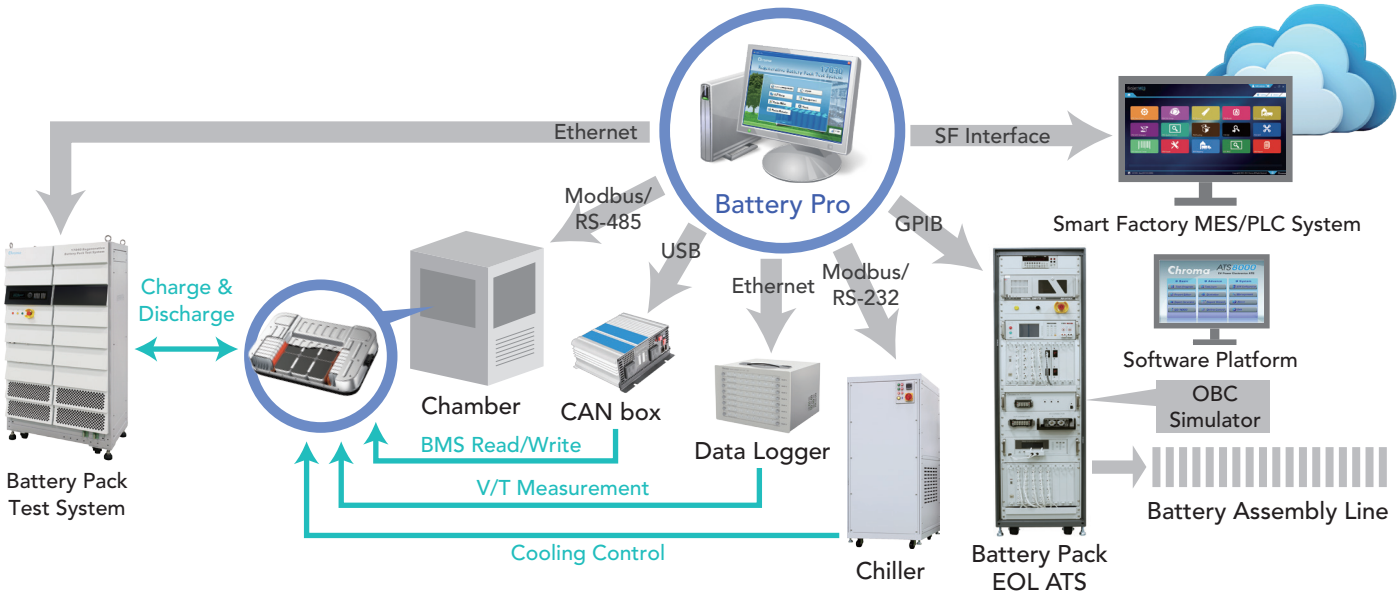


Efficiency

Flexible Integration for Complete Test Solution

The Chroma BatteryPro software integrates third-party software and hardware, such as BMS communication devices, data loggers, and thermostats; and uses their data to control the test programs and create complete test solutions.

- Thermostat: temperature and humidity control combined with charge/discharge procedures
- Data logger: temperature and voltage status of single battery cells or modules
- BMS data recorder: reading BMS data



Multiple Control Commands for Test System Expansion

Users can apply languages such as SCPI and CAN bus commands as well as LabVIEW and LabWindow driver programs to tailor the application software for operating Chroma 17040. The powerful, versatile architecture allows users to customize and integrate into the automated battery pack test system. The variety of integrational interfaces are for hardware-in-the-loop (HIL) test platform. Such as CAN bus, Ethernet, Analog I/O.

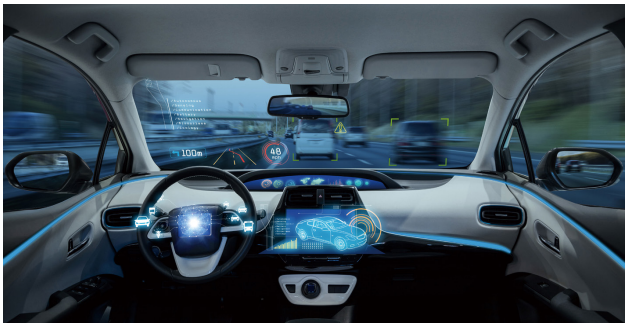
17040 Battery Simulator

Battery Pack Testbed

The VCU simulation function for Battery Pack Verification

Chroma 17040 offers the function which is vehicle control unit (VCU) simulation to communicate with Battery management system (BMS) during battery pack test. The test system can send SID to control the main relay of battery pack before do charging or discharging, then read the BMS data via SID "read data by identifier" and read diagnostic trouble code (DTC) via SID "read DTC information".

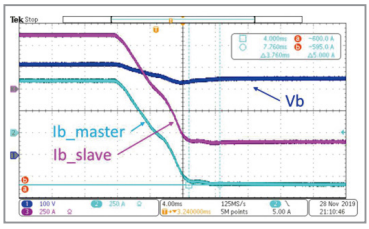
- Wake up: Tester present
- Unlock: Session control, Security access (seednkey)
- BMS reading: Read DTC information, Read data by identifier



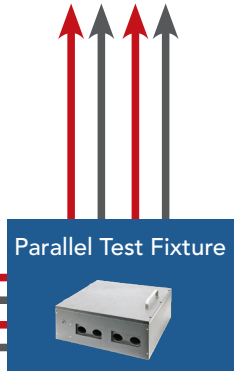
Parallel Synchronization for High Power Charging (HPC)

Chroma 17040 uses parallel synchronization to perform high-power testing with instant current slew synchronization. There is no delay in the slew time between the main channel and the auxiliary channel, which prevents current staircase waveforms from being generated. Users can connect up to two devices of the same model in parallel, and can operate the channels independently or in parallel. The test system provides customizable fixtures and allows parallel running of the output channels.

- Max. power 600kW; max. current 1,500A
- In dynamic current mode (waveform), under rated power 60~300kW, current rise time is 1ms (10%~90%)
- In dynamic current mode (waveform), under rated power 360~600kW, current rise time is 10ms (10%~90%)



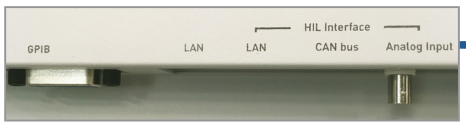
Current Rise Time Waveform
in CC Discharge

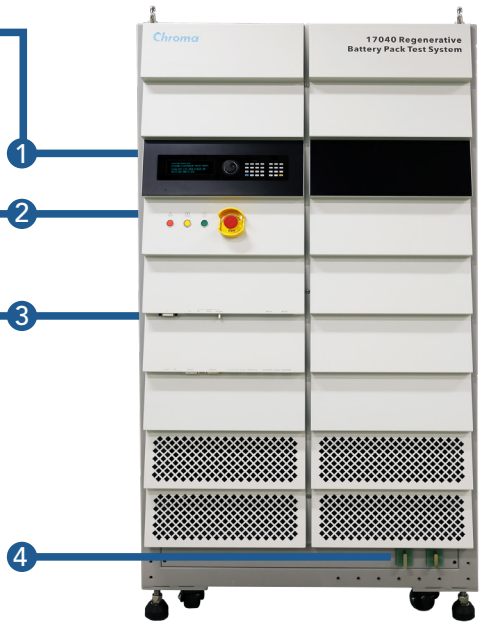


Ib Master

Ib Slave

HARDWARE CONFIGURATION





1. Control panel: manual setup mode and equipment calibration mode
2. Power switch/indicator/emergency buttons
3. Output/input interface: Ethernet, HIL, BMS, and I/O
4. DC Power output terminal

SYSTEM CONFIGURATION

60kW x 1CH
Supports two cabinets in parallel

H190 x W100 x D50cm
900kg

120kW: 60kW x 2CH
Supports two channels in parallel

120kW x 1CH
Supports two cabinets in parallel

H190 x W100 x 100cm
1800kg

180kWx1CH
Supports two cabinets in parallel

H190 x W150 x D100cm
2700kg

250kW: 125kW x 2CH
Supports two channels in parallel

250kW x 1CH
Supports two cabinets in parallel

H190 x W200 x 100cm
3600kg

300kW x 1CH
Supports two cabinets in parallel

H190 x W250 x D100cm
4500kg

360kW
Two 180kW x 1CH devices connected in parallel

H190 x W300 x D100cm
5400kg

500kW
Two 250kW x 1CH devices connected in parallel

H190 x W400 x D100cm
7200kg

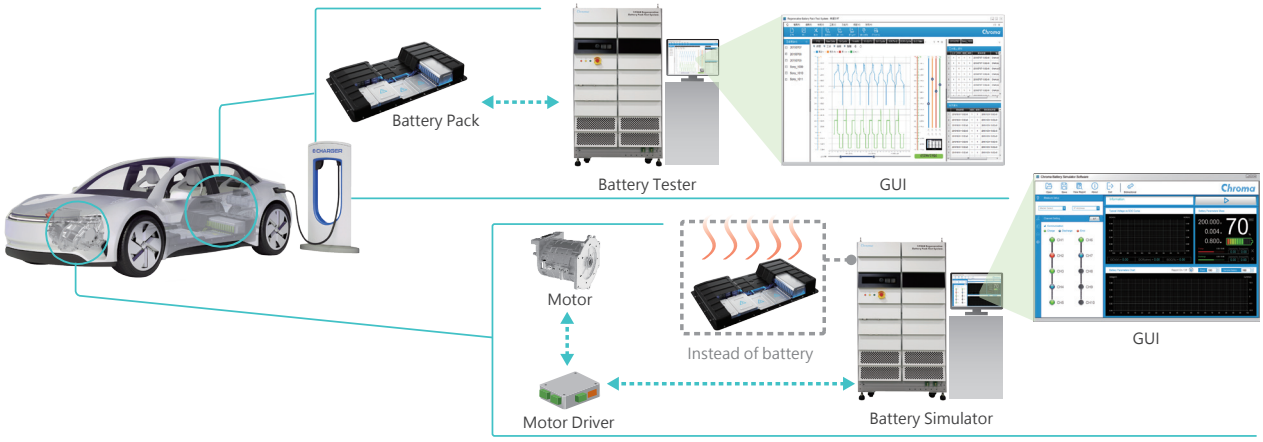
600kW
Two 300kW x 1CH devices connected in parallel

H190 x W600 x D100cm
9600kg

DUAL MODE APPLICATION

Chroma 17040 is equipped with a battery charge/discharge tester and a battery simulator, which can test battery packs and their connected products.

- Charger/discharger mode: applicable to battery pack testing via Battery Pro user interface
- Battery simulator mode: applicable to motor driver and charger via Battery Simulator user interface



BATTERY CHARGE/DISCHARGE SOFTWARE - BATTERY PRO

The software platform Battery Pro applies to Chroma 17040 and conforms to the diverse requirements for testing secondary battery packs with a high degree of safety and stability. It can save and restore data when the power is cut off to guard against potential data loss. The real-time monitor manages the test status through a variety of icons for clear multi-channel battery pack status browse. And have the operation and fault records with independent channel abnormalities.

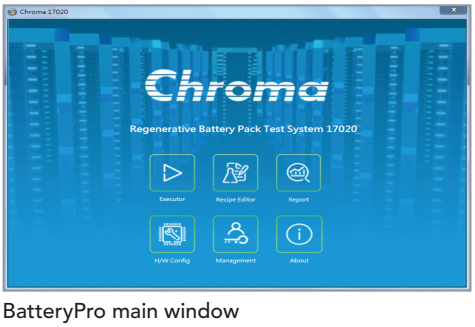
- Multilingual interface: English and Chinese (Mandarin)
- User permission setup: easy management of user operation authorities

Step Editing

- 255 editable charge and discharge conditions
- Dual layer loops (cycle & loop) with 9,999 per layer
- Editable dynamic charge and discharge waveforms
- Editable charge/discharge conditions incl. CV, CC, CP, CV, with current limit, waveform current, DCIR
- Cut-off conditions: time, power, voltage, current, temperature
- Step completed: next, end, jump, rest

Report Wizard

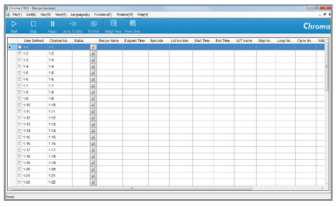
- Customized report formats, exports in PDF, CSV, and XLS
- Users can determine the X- and Y-axis parameters for report drawing and analysis, and directly produce the necessary test reports
- Reports generated: channel, cut-off, life-cycle, Q-V, V/I/T, etc.



BatteryPro main window

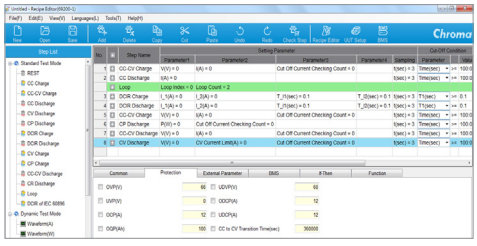
Recipe Executor

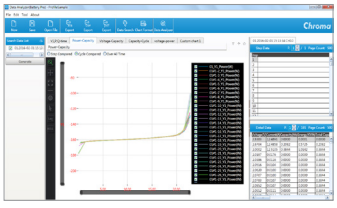
- ☑ Data display updates automatically in real time
- ☑ Flexible graphic and toolbar display based on the number of channels

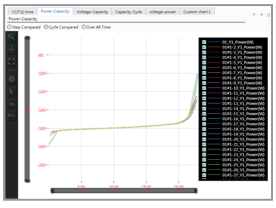


Data Analyzer

- ☑ Draw test charts at one click
- ☑ Define chart and favorite functions
- ☑ Compare multiple test objects







Recipe Editor

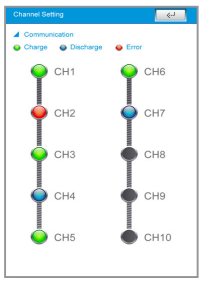
- ☑ ISO 12405, GB/T 31467, GB/T 31484, IEC 61960 DCIR and other test curves
- ☑ Interface for setting BMS data control charge/discharge equipment
- ☑ Variable editing functions, external parameters, if-then judgment functions

DUAL MODE APPLICATION

Chroma 17040 contains both a battery charger/discharger and a battery simulator to test battery packs and their connected products. When a product is still under development and the supplier's battery is not available, the test system can simulate the battery to verify whether the system is functioning normally. In addition, Chroma 17040 can control the SOC status of different batteries. Users can download different battery curves to test the DUT for charge and discharge status. The system can also perform battery and DUT collocation evaluation tests in advance that apply to the motor drivers' start-stop systems, light EV electric controllers, on-board chargers, etc.

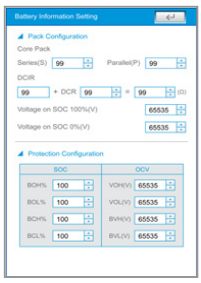
Battery Pack Simulation Functions

- Multi-channel battery pack characteristics simulation
- Battery pack charging/discharging simulation
- Battery characteristics curve setting
- Starting voltage and capacity initializing
- Battery pack total capacity setting
- Charge and discharge efficiency setting
- Battery DCR simulation
- Battery pack initialization cycle simulation
- Single channel bidirectional power supply



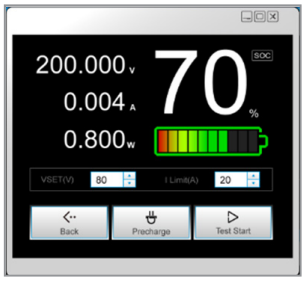
Battery Pack Protection Functions

- Over current protection
- Over voltage protection
- Battery high voltage/power warning
- Battery low voltage/power warning
- Battery over voltage/power protection
- Battery low voltage/power protection



Single Channel Bidirectional Power Supply

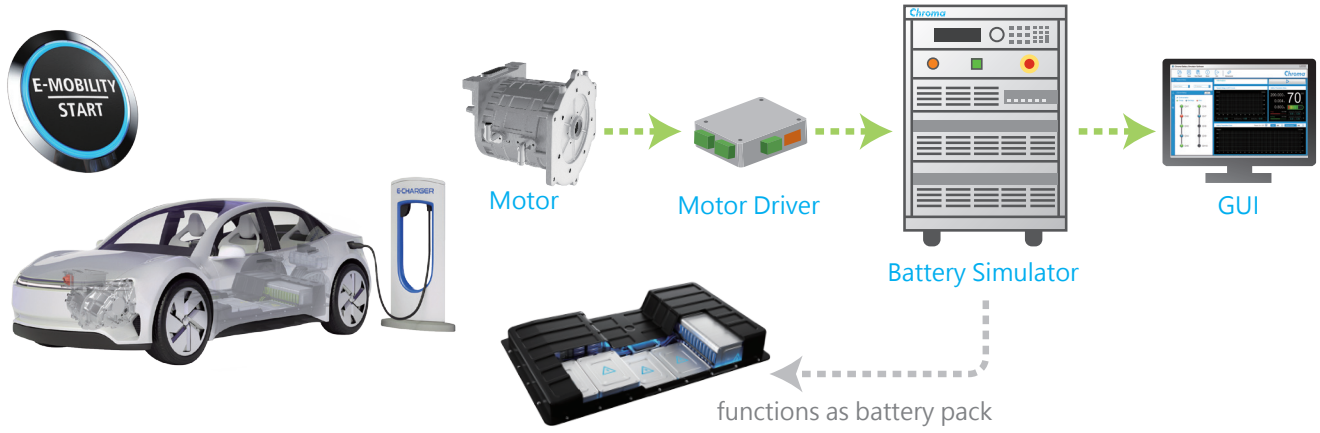
- Voltage/current/power display
- Voltage/current setting
- Pre-charge function: set the time required to generate specified voltage



Real-time Test Data Display

- Voltage/current/power display
- Voltage/current/power graphic display
- Battery pack charge/discharge curve display
- Test report output

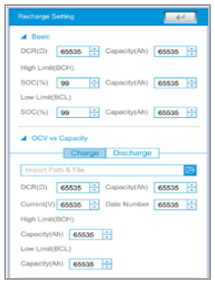
Motor Driver Testing for Vehicle 48V Start-stop System



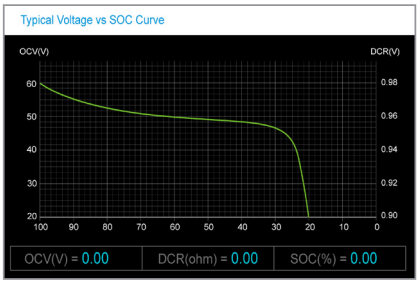
Battery Pro - Operation Interface of Battery Simulator

With the optional battery simulator, Chroma 17040 can charge and discharge bidirectional power supplies. Via the included Battery Pro software, it can also set the battery capacity, DCR, and V-SOC curve for charger, inverter, and motor driver testing.

Battery Simulator Main Window



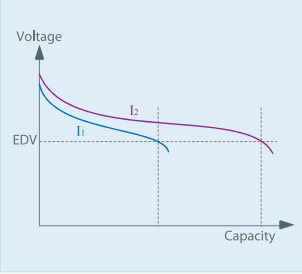
DCR Setup



Battery Characteristics V-SOC Curve Setup

CAPACITY TEST

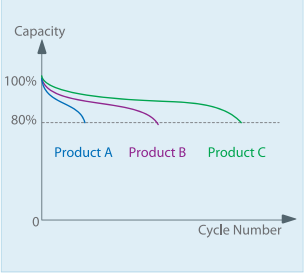
The capacity can be obtained as the integral of the discharge current versus time, which requires test equipment with high current accuracy. Although each battery comes with specifications indicated by the manufacturer, these often use capacity testing at low charge/discharge rates, whereas power battery applications are usually charged and discharged at high rates, thus leaving a gap between the specification and the actual capacity. Chroma 17040 refers to the final charge/discharge rates of the power battery and gives a more accurate battery capacity.



Capacity Test

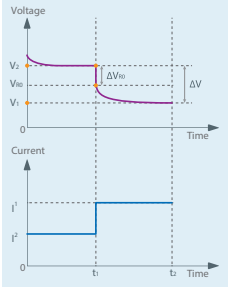
CYCLE LIFE TEST

Cycle life is a highly important test item for batteries. Chroma 17040 uses user-defined charging and discharging conditions as a cycle and tests the same battery repeatedly until the capacity reaches the cut-off power condition. The larger the number of successful cycles, the longer the cycle life of the battery. Testing under the same test conditions is useful to evaluate the performance of different battery products or define the applicable conditions of use.

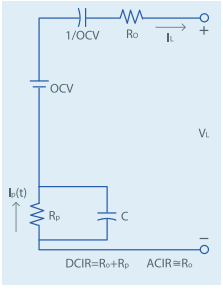


Cycle Life Test

BATTERY DCIR TEST



DCIR Test



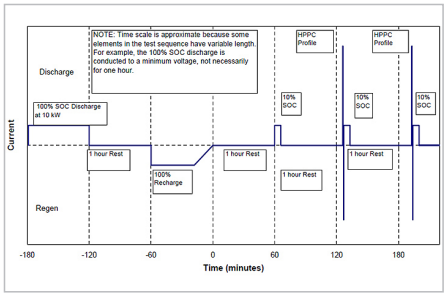
Li-ion battery Equivalent Circuit Model

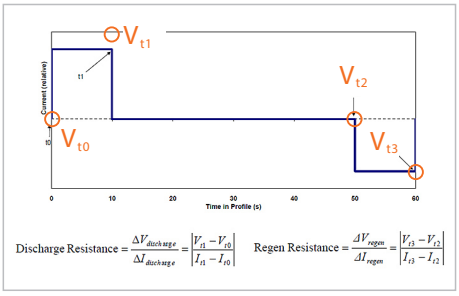
$$DCIR = R_O + R_P = \frac{\Delta V}{\Delta I} = \frac{|V_{t2} - V_{t1}|}{|I \quad I|}$$

The internal resistance value is related to the charge/discharge ratio of a battery. The larger the internal resistance value, the lower the efficiency when temperature rises. According to the lithium-ion battery equivalent circuit model, traditional ACIR measurement of 1KHz LCR meters can only evaluate the battery's conductive resistance (Ro) that affects the instantaneous power output, but is unable to evaluate the polarization resistance (Rp) produced during electrochemical reaction. DCIR evaluation includes the ACIR, and is closer to the actual polarization effect of batteries under continuous power application. Chroma 17040 calculates the DCIR value using the voltage difference caused by the two-step current change, without any manual calculation, and automatically obtains the test results compliant with IEC 61960

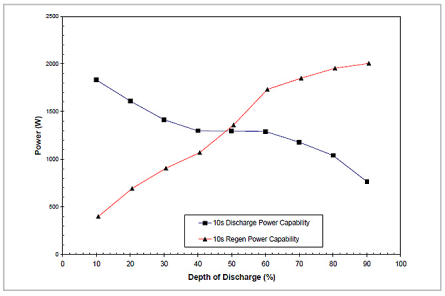
HPPC TEST

HPPC is a test program created by the US Department of Energy to test the battery power performance of hybrid and electric vehicles. Its main purpose is to establish the relationship between the depth of discharge and power within the battery's operation voltage range. The secondary test purpose is to establish the depth of discharge, conductive resistance, and polarization resistance within the battery voltage range, through the voltage response curve from discharging, standing, and charging. Chroma 17040 evaluates the power recession of the following life test and develops the equivalent circuit model of the power battery. Users can automatically obtain the test results compliant with the HPPC standards without any manual calculation

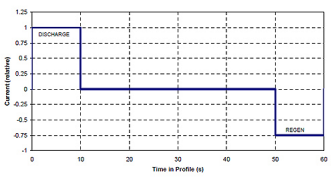


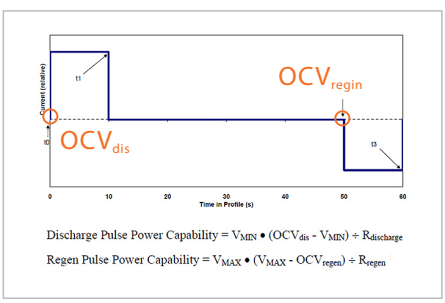


$$\text{Discharge Resistance} = \frac{\Delta V_{discharge}}{\Delta I_{discharge}} = \left|\frac{V_{t1} - V_{t0}}{I_{t1} - I_{t0}}\right| \qquad \text{Regen Resistance} = \frac{\Delta V_{regen}}{\Delta I_{regen}} = \left|\frac{V_{t3} - V_{t2}}{I_{t3} - I_{t2}}\right|$$



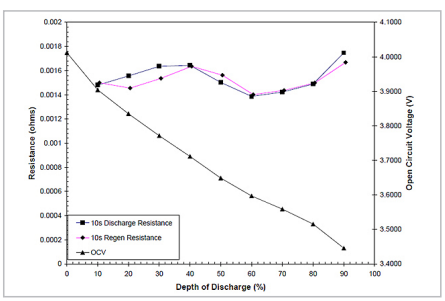
Time Increment (s)	Cumulative Time (s)	Relative Currents
10	10	1.00
40	50	0
10	60	-0.75





Discharge Pulse Power Capability = V_{MIN} • (OCV_{dis} - V_{MIN}) ÷ $R_{discharge}$

Regen Pulse Power Capability = V_{MAX} • (V_{MAX} - OCV_{regen}) ÷ R_{regen}



* The content and diagrams of the HPPC are referring to the U.S. Department of Energy Vehicle Technologies Program INL/EXT-07-12536

SPECIFICATIONS -1

Model		17040				
Max. Power		60kW	120kW	120kW	180kW	250kW
Max. Power per channel		60kW	60kW	120kW	180kW	125kW
Max. Voltage per channel		1,000V	1,000V	1,000V	1,000V	1,000V
Max. Current per channel		150A	150A	300A	450A	300A
Channel		1	2	1	1	2
Constant Voltage Mode						
Voltage Range *2		60~1000V	60~1000V	60~1000V	60~1000V	60~1000V
Voltage Accuracy		0.1% F.S.	0.1% F.S.	0.1% F.S.	0.1% F.S.	0.1% F.S.
Voltage Resolution		20mV	20mV	20mV	20mV	20mV
Constant Current Mode						
Max. Current per channel *3		150A	150A	300A	450A	300A
Current Accuracy		0.1% F.S.	0.1% F.S.	0.1% F.S.	0.1% .S.	0.1% F.S.
Current Resolution		10mA	10mA	20mA	30mA	20mA
Max. Current per system		150A	150A	300A	450A	300A
Constant Power Mode						
Max. Power per channel		60kW	60kW	120kW	180kW	125kW
Current Accuracy		0.2% F.S.	0.2% F.S.	0.2% F.S.	0.2% F.S.	0.2% F.S.
Power Resolution		100mW	100mW	100mW	100mW	100mW
Measurement						
Voltage Range (3 scales as F.S.)	1	60~1000V	60~1000V	60~1000V	60~1000V	60~1000V
	2	700V	700V	700V	700V	700V
	3	450V	450V	450V	450V	450V
Voltage Accuracy		±(0.02% rdg + 0.02% F.S.)				
Current Range (4 scales as F.S.)	1	150A	150A	300A	450A	300A
	2	75A	75A	150A	225A	150A
	3	30A	30A	60A	90A	60A
	4	10A	10A	10A	30A	10A
Current Accuracy		±(0.05% rdg + 0.05% F.S.)				
Power Accuracy		±0.15% F.S.	±0.15% F.S.	±0.15% F.S.	±0.15% F.S.	±0.15% F.S.

Model		17040				
Max. Power		250kW	300kW	360kW	500kW	600kW *1
Max. Power per channel		250kW	300kW	180kW	500kW	300kW *1
Max. Voltage per channel		1,000V	1,000V	1,000V	1,000V	1,000V
Max. Current per channel		600A	750A	450A	600A	750A
Channel		1	1	2	2	2
Constant Voltage Mode						
Voltage Range *2		60~1000V	60~1000V	60~1000V	60~1000V	60~1000V
Voltage Accuracy		0.1% F.S.	0.1% F.S.	0.1% F.S.	0.1% .S.	0.1% F.S.
Voltage Resolution		20mV	20mV	20mV	20mV	20mV
Constant Current Mode						
Max. Current per channel *3		600A	750A	450A	600A	750A
Current Accuracy		0.1% F.S.	0.1% F.S.	0.1% F.S.	0.1% F.S.	0.1% F.S.
Current Resolution		40mA	50mA	30mA	40mA	50mA
Max. Current per system		600A	750A	900A	1,200A	1,500A
Constant Power Mode						
Max. Power per channel		250kW	300kW	180kW	250kW	300kW
Current Accuracy		0.2% F.S.	0.2% F.S.	0.2% F.S.	0.2% F.S.	0.2% F.S.
Power Resolution		1W	1W	100mW	1W	1W
Measurement						
Voltage Range (3 scales as F.S.)	1	60~1,000V	60~1000V	60~1000V	60~1000V	60~1000V
	2	700V	700V	700V	700V	700V
	3	450V	450V	450V	450V	450V
Voltage Accuracy		±(0.02% rdg + 0.02% F.S.)				
Current Range (4 scales as F.S.)	1	600A	750A	450A	600A	750A
	2	300A	375A	225A	300A	375A
	3	120A	150A	90A	120A	150A
	4	40A	50A	30A	40A	50A
Current Accuracy		±(0.05% rdg + 0 .05% F.S.)				
Power Accuracy		±0.15% F.S.	±0.15% F.S.	±0.15% F.S.	±0.15% F.S.	±0.15% F.S.

GENERAL SPECIFICATIONS

Battery Charge & Discharge Test System		17040	
Operating Mode	Charge	CC, CV, CP, Waveform Power, Waveform Current, DCIR	
	Discharge	CC, CV, CP, CR, Waveform Power, Waveform Current, DCIR	
Current Rising/ Falling Time	Power Rating	Max. power 60~300kW	Max. power 360~600kW
	>50% Full Load	1ms (10% to 90%)	10ms (10% to 90%)
Current Switching Time	Power Rating	Max. power 60~300kW	Max. power 360~600kW
	>50% Full Load	2ms (-90% to 90%)	20ms (-90% to 90%)
Current Ripple		<0.5% F.S.	
Overshoot		<1% F.S.	
Temperature Coefficient (Voltage/Current)		<50 ppm/℃	
Battery Simulator, CV Source			
Internal Resistance Setting		0.01~0.2 Ω	
Output Noise		0~20MHz	
Voltage Ripple (P-P)		<2% F.S.	
Voltage Ripple (rms)		<1% F.S.	
Transient Response Time *4		15 ms	
Bi-directional Transient Response Time *5		30 ms	
Road Regulation (Current Sink with Transient Response Time)		<10V	
Program Time *6		5V/ms	
AC Input			
Line Voltage/Frequency (3 phase/4 wire with earth ground)		Input 200~220V_{ac} ±10% V_{LL} , 47~63Hz ; Input 380~400V_{ac} ±10% V_{LL} , 47~63Hz Input 440~480V_{ac} ±10% V_{LL} , 47~63Hz	
Power Factor		> 0.95 (at rated power)	
I_T.H.D		< 5% (at rated power)	
Others			
Efficiency		>88~90% (at rated power)	
Communication Interface *7		Ethernet/CANbus	
Operating Temperature		0℃~40℃	
Protection		UVP, OCP, OPP, OTP, FAN, Short	
Regenerative Certification (option)		VDE-AR-N 4105 Annex F.4 (NS protection)	
Safety & EMC		CE	
Noise Level		< 70dB	
Analog programming Interface *8			
Analog Output (measurement Volt. & Current)		2 ports (2 wires)	
Voltage and Current monitor/ Programming (Resolution/ Voltage Range/ Response time/ Input Impedance)		16 bit / ±10V / < 3ms / 10 MΩ	
Analog Input (Current control)		1 port (2 wires)	
Analog Input (Voltage control)		1 port (2 wires)	
Digital Input/ Output Interface for Safety *8			
Isolated Digital I/O		8 ports input pin ; 8 ports output pin	
Isolated Digital Input		Logic 0 (VIL): 0~0.8V ; Logic 1 (VIH): 2.5 Vmin (max. 24V)	
Isolated Digital Output		Output Type: Dry Contact (Open: high ; Close: Low) ; Output Voltage: 5~24 VDC Sink Current: 1A max.	

Dimension and Weight *9			
	Cabinet (H x W x D) / Weight	Front / Rear / Right side for heat dissipation	Front / Rear / Right side for maintenance
60kW	190cm x 100cm x 50cm / 900 kg	30cm / -- / --	60cm / -- / --
120kW (60kW x 2CH)	190cm x 100cm x 100cm / 1800 kg	30cm / 30cm / --	60cm / 60cm / --
120kW	190cm x 100cm x 100cm / 1800 kg	30cm / 30cm / --	60cm / 60cm / --
180kW	190cm x 150cm x 100cm / 2700 kg	30cm / 30cm / 30cm	60cm / 60cm / 60cm
250kW (125kW x 2CH)	190cm x 200cm x 100cm / 3600 kg	30cm / 30cm / --	60cm / 60cm / --
250kW	190cm x 200cm x 100cm / 3600 kg	30cm / 30cm / --	60cm / 60cm / --
300kW	190cm x 250cm x 100cm / 4500 kg	30cm / 30cm / 30cm	60cm / 60cm / 60cm
360kW (180kW x 2CH)	190cm x 300cm x 100cm / 5400 kg	30cm / 30cm / 30cm	60cm / 60cm / 60cm
500kW (250kW x 2CH)	190cm x 400cm x 100cm / 7200 kg	30cm / 30cm / --	60cm / 60cm / --
600kW (300kW x 2CH)	190cm x 500cm x 100cm / 9000 kg	30cm / 30cm / 30cm	60cm / 60cm / 60cm

*1 : All specifications are subject to change without notice.
*2 : The output range of voltage is referred by the cabling.
*3 : The connection between the device and battery is a standard provided cable of 10m long.
*4 : The voltage specification can be guaranteed when the external load transitions from 10% to 90% and the transition time required is greater than the specification.
*5 : The voltage specification can be guaranteed when the external load transitions from -90% to 90% and the transition time required is greater than the specification.
*6 : The spending time from zero to the maximum voltage is at no-load condition.
*7 : The interface between BatteryPro (IPC) to 17040 is through Ethernet.
*8 : Used for specific applications, please contact Chroma's sales representative.
*9 : Please reserve additional space for maintenance when planning equipment placement.

ORDER INFORMATION

Regenerative Battery Pack Test System Model 17040				
Power Range	Voltage	Current per CH / Max.Current per System	Channels	AC Input
60kW	1,000V	150A / 150A	1	Input 200~220Vac / Input 380~400Vac / Input 440~480Vac
120kW (60kW x2 CH)	1,000V	150A / 300A	2	Input 200~220Vac / Input 380~400Vac / Input 440~480Vac
120kW	1,000V	300A / 300A	1	Input 200~220Vac / Input 380~400Vac / Input 440~480Vac
180kW	1,000V	450A/ 450A	1	Input 380~400Vac / Input 440~480Vac
250kW (125kW x 2CH)	1,000V	300A/ 600A	2	Input 380~400Vac / Input 440~480Vac
250kW	1,000V	600A/ 600A	1	Input 380~400Vac / Input 440~480Vac
300kW	1,000V	750A / 750A	1	Input 380~400Vac / Input 440~480Vac
360kW (180kW x 2CH)	1,000V	450A / 900A	2	Input 380~400Vac / Input 440~480Vac
500kW (250kW x 2CH)	1,000V	600A / 1,200A	2	Input 380~400Vac / Input 440~480Vac
600kW (300kW x 2CH) *	1,000V	750A / 1,500A	2	Input 380~400Vac / Input 440~480Vac

* 600kW is a customized product. Please call for availability.

Options	
A170201	IPC for Battery Test System
A170202	Battery Simulator Soft Panel
A170400	Battery Pro Software
Vector VN1630/VN1640	CAN Bus Interface Card

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